

Problem C: The Wood Where Things Have No Name

Alice's exploration of the outside world continues, and she meets a friendly Gnat, who tells her many interesting things about the insects that live in the Looking-Glass world, such as the rocking-horse-fly and the bread-and-butter-fly. However, the Gnat warns Alice, "further on, in the wood down there, they've got no names," which means exactly what you would think –in that wood, nothing has a name.

Understandably, Alice was a little worried about what would happen to her when she entered the wood. All of a sudden she noticed that she had forgotten the names of the things around her, even her own name! She was trying to remember it, when a Fawn came wandering by.

"What do you call yourself?" the Fawn said at last.

"I wish I knew!" thought poor Alice. "Nothing, just now."

"Think again," it said: "that won't do."

Alice thought, but nothing came of it. "Please, would you tell me what you call yourself? I think that might help a little."

"I'll tell you, if you'll come a little further on," the Fawn said. "I can't remember here."



Figure 1: Alice and the Fawn

So they walked on together through the wood till they came out into another open field, and here the Fawn jumped excitedly. "I'm a Fawn!" It cried out in a voice of delight. "And, dear me! you're a human child!" A sudden look of alarm came into its eyes, and in another moment it had darted away at full speed.

The wood has the shape of a convex polygon and, as you have learned, inside its area nothing has a name. If Alice walks in a straight line and enters the wood, what is the maximum possible distance that she has to walk until she can remember her name again?

Consider the following example: let's say that the wood is delimited by the following six vertices (in counter-clockwise order): $(0,0), (2,0), (5,3), (5,5), (3,5), (0,2)$.

The diagram below illustrates this case, where the maximum distance is between the points $(0,0)$ and $(5,5)$ and has a magnitude of about 7.071.

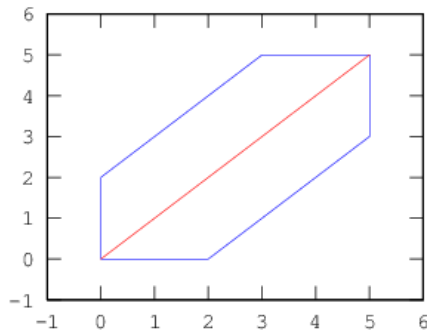


Figure 2: Wood's perimeter, and its maximum diameter

Input

Input starts with a positive integer T , that denotes the number of test cases ($T \leq 30$).

The first line of each test case contains an integer N , which denotes the number of points of the polygon.

$$3 \leq N \leq 10000$$

The following N lines contain two integers x and y , which are the coordinates of one of the vertices of the polygon. The polygon is described with all its vertices in counter-clockwise order. You can assume that the polygon described is convex, and that no three consecutive vertices are collinear.

$$-10^6 \leq x, y \leq 10^6$$

Output

For each test case, print the case number, and then print the maximum possible distance for Alice to walk across the wood in a straight line. Print the answer as a real number with exactly three digits after the decimal point.

Sample Input

```
3
6
0 0
2 0
5 3
5 5
3 5
0 2
4
10 10
20 10
20 20
10 20
3
-3 -2
0 -2
0 2
```

Output for Sample Input

Case 1: 7.071
Case 2: 14.142
Case 3: 5.000

Note

The test data is large. Make sure to use fast I/O methods.